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During the first apparition no less than 950 observations were secured at some fifty-four different observatories, from September 20, 1884, to April 6, 1885. During these six and one-half months the comet described 106 degrees of its heliocentric arc, 35° before and 71° after perihelion passage. Numerous observations were obtained toward the close of the apparition, thus strengthening greatly that part of the arc and giving the final elements greater security. The definitive elements were computed by THRAEN, and both he and L. STRUVE computed the perturbations between the first and second apparitions, and provided ephemerides by means of which SPITALER rediscovered the comet, May 1, 1891.

At the second apparition the comet again remained visible for a long time, until March 31, 1892, and no less than 681 observations at thirty-three different observatories were obtained. THRAEN again computed the definitive elements, making use of the data of both the first and second apparitions and taking into account the perturbations of the Earth, *Mars*, *Jupiter* and *Saturn*. The elements which he finally obtained, when referred to the ecliptic and the mean equinox of 1898.0, are as follows:—

Epoch and Osculation 1898 August 22.0 Berlin M. T.

$$\left.\begin{array}{rrrrl} M = & 6^\circ & 58' & 11''.03 \\ \omega = & 172 & 52 & 35 & .77 \\ \Omega = & 206 & 27 & 22 & .26 \\ i = & 25 & 12 & 16 & .59 \\ \phi = & 33 & 44 & 2 & .15 \end{array}\right\}\begin{array}{c}\text{Ecliptic and} \\ \text{Mean Equinox of 1898.0}\end{array}$$

$$\mu = 518''.36764$$

$$\log a = 0.5569125$$

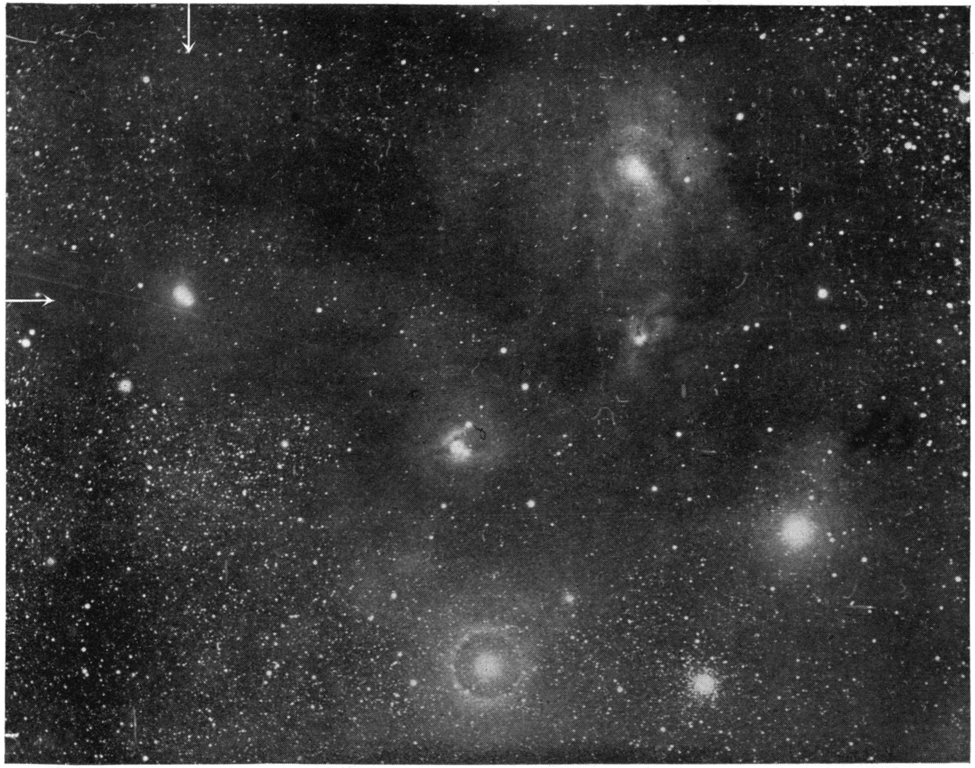
The accuracy of these elements is very great, as is shown by the close agreement of the computed and observed places of the comet at the time of its rediscovery this year, and they reflect great credit upon their author.

MT. HAMILTON, July 11, 1898.

COMET *c*, 1898 (CODDINGTON).

BY E. F. CODDINGTON.

On the evening of June 9th, I made an exposure of two hours with the Crocker photographic telescope, for the purpose of obtaining a photograph of the extensive nebulous region to the



DISCOVERY-PLATE OF COMET CODDINGTON.

1898, June $9^d\ 9^h\ 30^m$ to $11^h\ 45^m$ P. S. T.

[Comet is at intersection of arrows.]

north of *Antares* in the constellation *Scorpio.* At the time changes were being made in my darkroom, and it was not until June 11th that I had an opportunity to develop the plate. When the plate was developed a strong trail, about one-sixteenth inch in length, was found upon it, some two or three degrees northeast of *Antares.* The length and direction of the trail indicated the possible positions in which the object might be found, and on turning the 12-inch telescope to the proper region the comet was picked up immediately, and observed for position by Professor HUSSEY.

At the time of discovery, the comet had a bright nucleus of about the 8th magnitude, surrounded by a nebulosity somewhat less than a minute of arc in diameter. The nucleus was very nearly stellar, and when examined with the 36-inch refractor, using a power of 1000, it presented a uniform appearance. There was a slight indication of a tail on one side of the nebulosity, but the comet was so near opposition that whatever tail it may have had, extended almost directly away from the comet in the line of sight. When discovered the comet was near *Antares* and since then it has been moving steadily towards the southwest, a little more than a degree per day. It is already too far south to be observed at most northern observatories. By the middle of August it will have reached a southern declination of 50 degrees and will then be in the constellation *Centaurus.* It will remain visible for some time to the observatories of the southern hemisphere.

This is the third comet which has been discovered by photography. On October 12, 1892, Professor BARNARD found the trail of a hitherto unknown comet upon a photograph of the Milky Way, which he had just obtained with the Crocker telescope.

Professor SCHAEBERLE was the next to discover a comet by means of photography. He found the image of some strange object on some of his eclipse negatives taken at Mina Bronces, Chile, in 1893, and verified its cometary nature by means of the plates taken by other eclipse parties. This comet was never observed visually, and its orbit is unknown.

The accompanying half-tone shows the trail of the comet and also gives a fair representation of a very remarkable region of the sky. At the lower central part of the reproduction is the bright star *Antares* with the cluster, *Messier 4*, just to the right. Just above we find an area which stands out in a marked contrast to the surrounding region, by being almost void of faint stars. Instead we find a large nebula with its principal condensations surrounding the few bright stars that are situated here. A great deal of delicate detail can be traced on the original negative and the vacant lanes running eastward from this region are prominent features. The comet was crossing one of these lanes at the time of exposure. And it may be found on the accompanying illustration near the left margin. I hope to secure a better negative of this region. This one is reproduced on account of the comet trail.

Using the following observations:—

	Mt. Ham. M. T.	app α	app δ	Observer
June 11,	$9^h\ 13^m\ 7^s$	$16^h\ 24^m\ 56^s.21$	$-25°\ 14'\ 20''.0$	Hussey
13,	10 47 36	16 17 58 .38	$-26\ 33\ 3\ .3$	Tucker
15,	8 43 30	16 11 23 .71	$-27\ 45\ 12\ .7$	Hussey

Professor HUSSEY and I computed the following preliminary elements:—

$$T = 1898 \text{ Sept. } 10.3054 \text{ Gr. M. T.}$$

$$\left.\begin{array}{l} \omega = 229°\ 28'\ 11'' \\ \Omega = \ \ 73\ \ 59\ \ \ 5 \\ i = \ \ 71\ \ 17\ \ 49 \end{array}\right\} \begin{array}{c}\text{Ecliptic and}\\ \text{Mean Equinox of 1898.0}\end{array}$$

$$\log q = 0.24760$$

$$(O-C):\ \Delta\lambda' \cos\beta' = +4'',\ \Delta\beta' = +2''$$

From Mt. Hamilton observations of June 11th, 18th and 26th, I have computed the following elements of this comet. The mean of three observations was used in forming the middle place, and the mean of two observations for the last place.

$$T = 1898 \text{ Sept. } 13.97347 \text{ Gr. M. T.}$$

$$\left.\begin{array}{l} \omega = 233°\ 10'\ 31''.4 \\ \Omega = \ \ 73\ \ 59\ \ 19\ .8 \\ i = \ \ 69\ \ 56\ \ 47\ .3 \end{array}\right\} \begin{array}{c}\text{Ecliptic and}\\ \text{Mean Equinox of 1898.0}\end{array}$$

$$\log q = 0.231178$$

$$(O-C):\ \Delta\lambda' \cos\beta' = +4''.7,\ \Delta\beta' = +1''.8$$

MT. HAMILTON, July 11, 1898.